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FIELD REPAIRS ON MUSIC INSTRUMENTS
OF THE PUBLIC SCHOOL

by

Lawerence Harold Johnson

B. M. University of Montana, 1957

Presented in partial fulfillment of the requirements for the degree of

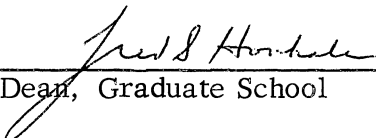
Master of Music

UNIVERSITY OF MONTANA

1967

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PREFACE AND ACKNOWLEDGMENTS

Many small instrumental repairs or emergency repairs can be made by an instrumental teacher if he or she is so inclined thus rendering the instrument useful in as short a time as possible . The author has attempted to offer helpful suggestions for such emergency repairs . Many of the ideas and suggestions found herein are those of instrumental teachers . Most all the suggestions found in the paper have been tried and found to be practical . They are not offered as advice for the professional repairman .

The author is greatly indebted to Dr . Lloyd Oakland and Mr . Laurence Perry, both of the University of Montana, Department of Music for their many helpful suggestions and guidance . The author further wishes to give thanks to all the instrumental teachers who through conversation and correspondence, have added greatly to the content of the paper .

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CHAPTER I

WOODWIND INSTRUMENTS

Binding Rods

Usually a rod will bind from one of four causes: the pivot post has turned or loosened a little one way or the other; the pivot post has been bent too tightly against the key rod; the key rod itself has been bent; or a bent pivot or hinge screw.

Loosening the pivot screw may help as a temporary solution.

If it is determined that a post in a wooden instrument has worked loose and needs tightening, it is best that the job be left to a competent repairman, especially if the horn is expensive. The amateur may strip the hole thus making the problem more serious. If the binding is caused by a bent rod, with care and a good eye, the rod can be gently straightened; but do not use a metal hammer for the straightening. If the binding is caused by a post being bent, (usually inward) a hardwood dowel can be placed against the top of the post and struck lightly in the opposite direction from which it was bent. Sometimes a bent pivot screw can be straightened but it is best to have it replaced.

Cleaning Cork Joints

Equipment needed:

- Light machine oil or Vaseline
- Clean rags
- Cork grease

An easy method to clean a dirty cork joint is to generously apply a light

machine oil (3 in 1) to the cork. Rub the light oil well into the cork, and the friction and heat of the fingers will loosen much of the pressed-in dirt. Then wipe the cork dry of all light oil and dirt. If the instrument is to be used after cleaning, apply a good grade of cork grease to the newly cleaned cork. Vaseline may be used in place of the light machine oil.¹ The above method can also be used to clean key corks!

Cleaning Mouthpieces

Materials needed:

- Warm water
- Soap
- Alcohol
- Clean rags
- Pipe cleaners

The mouthpiece should first be washed with warm water and plenty of soap to remove the food and dirt particles. Commercial alcohol may be used on a cloth to wipe off the mouthpiece. Do not soak mouthpieces in alcohol unless they are all metal. Alcohol will discolor rubber and will also loosen any corking on woodwind mouthpieces.

Use extreme caution when brushing out woodwind mouthpieces so the inside and facing will not be scratched or injured.

It is convenient to keep a bottle of peroxide and a roll of antiseptic cotton in the instrument room for students to use to clean mouthpieces when they play another's instrument.

¹ Erick D. Brand, Band Instrument Repairing Manual, (Elkhart, Indiana, Fourth Edition 1946), p. 79.

All metal mouthpieces may be heated or boiled to sterilize. If there is any fiber or corking on the mouthpiece, this process will not work because the heat tends to soften these substances and they lose their shape. If it is desired to use a disinfectant to soak composition type mouthpieces, a druggist can prepare a solution that will not harm them but will work very effectively.²

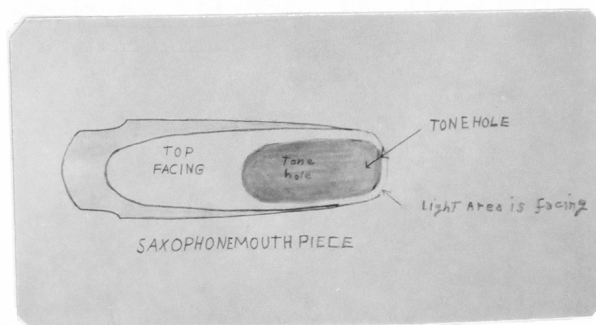


FIGURE 1

Facing Area of Single Reed Mouthpiece

Many teachers advise their students to wipe off the reed on such instruments as the oboe, bassoon, clarinet, and saxophone, before putting the horn away. This eliminates any build-up of food or saliva deposits which will soon cause tonal distortion. A clean handkerchief can be used to wipe off the reed by wiping it from the heavy end to the tip of the vibrating end.

The double reed can be cleaned or wiped out by pushing a clean, straight pipe cleaner through the reed, starting at the pipe end on out between

²Ibid.

the two reeds. Caution: after the tip of the pipe cleaner passes between the tips of the two reeds, do not attempt to pull the cleaner back through the reed as this may cause the reed tip to break.

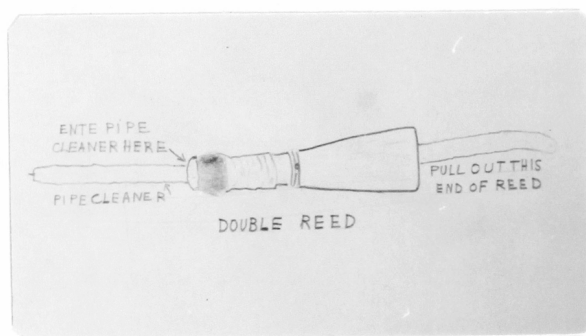


FIGURE 2

Cleaning a Double Reed with a Pipe Cleaner

Cleaning Pads

Equipment needed:

- Lubrication oil or Vaseline or key oil
- Clean cloth
- Warm water and soap

When pads stick to tone holes they usually need to be cleaned, and with the aid of either lubrication oil, Vaseline, or key oil, and a piece of clean cloth, pads can be softened and cleaned. The oil will often times soften a pad enough that it can be used until new pads can be purchased.

First, with a small portion of the clean cloth covering the index finger, dip it in the oil or Vaseline until there is a small amount of lubricant on the cloth; then rub this moistened cloth over the pad as if polishing the pad. Be

careful not to rub hard, as too much pressure while rubbing skin pads will tear the skin off the cushion, thus ruining the pad altogether. When satisfied with the results of the cleaning, wipe the pad dry of any lubricant, again being careful not to destroy the pad. Leather pads are not as delicate and cannot be harmed as easily.³

Perma pads are easily cleaned with a damp, clean cloth in the same manner as skin pads. This type of pad causes trouble by becoming sticky, and when this happens, it should be replaced.

Cleaning and Repairing Instrument Cases

Equipment needed:

- A little kerosene mixed in water
- Water
- Clean rags
- Liquid shoe polish (type that will not rub off)
- Compressed air (which can usually be found in the school's machine or manual arts shop)
- Paint thinner and varnish
- Athletic tape
- Fiberglass cloth
- Spot remover

The outside of a case can be cleaned by wiping it with a clean rag that has been dipped in a mixture of kerosene and water. This works particularly well on black or dark cases. Finish the job by drying the outside of the case with a clean cloth.⁴

³Ibid., p. 78.

⁴Ibid., p. 183.

Deep scuffs may be hidden somewhat by the use of a good liquid shoe polish that will not rub off. For light colored cases, a neutral polish may be tried in order to fade out scuff marks.

Another way to make an old case look better is to paint the outside with a mixture of paint thinner and varnish. The mixture is about two tablespoons of varnish in about one-half pint of paint thinner. The case then must dry for about twenty-four hours before using.⁵ If one applies a good coat of liquid shoe polish before brushing on the mixture, the finished job will be a much neater appearing case.

Many times a badly worn instrument case will break a little at the corners exposing some of the lining material inside the case. If a case is worn this badly, one should not be as concerned about the appearance as the protection the case offers to the instrument. By using atheltic tape in wide strips along the cracks or corners of the case, the case can be made more secure. The corners should be pulled together as much as possible while applying the tape. Fiberglass cloth and Glassskin Plastic Resin 6605 by Fuller Paint Company, when properly applied to a damaged instrument case, will produce a very tough and sturdy repair job that can be sanded and painted.

The inside of an instrument case can be cleaned out nicely with the use of compressed air. The lint and dirt can be blown out of the case more efficiently this way than any other way. For clarinet or flute cases that are matted from

5

Ibid.

cork grease deposits, a spot remover will clean them out.⁶ Carbon tetra - chloride works well for cleaning these spots but it should be used only in a well ventilated room and in small amounts because it is toxic .

Cleaning Woodwind Instruments .

It is best not to attempt to clean the inside of a woodwind instrument except for swabbing it out after each playing . If these instruments have to be disinfected, they should be taken to a competent repairman .

It is possible to submerge the metal and composition wind instruments in warm, soapy water for two or three minutes, but prolonged soaking may cause damage to the pads . Wooden instruments should not be placed in water by the amateur repairman .

Wipe the large flat surfaces of such instruments as the clarinet, oboe, flute, saxophone and bassoon with a clean, damp cloth . The areas with congested working parts should only be dusted with a kitchen pastry brush, or a pipe cleaner .

Corking Repair Keys

Equipment needed:

- Small alcohol lamp
- Sharp knife
- Proper thickness cork
- A damp cloth
- Stick shellac
- Fine sandpaper or emery board

6

Ibid., p. 183.

Before removing old cork, observe its thickness because this will be helpful when selecting the thickness for new cork. Next, remove the key from the instrument. If the cork is almost all off the key, or is off, the dull edge of a knife is a good instrument to scrape the old shellac from the key. After scraping off the old cork and shellac, use fine sandpaper to finish cleaning the metal area where new cork is to be applied.

If the cork is old and chipped, but still clings solidly to the key, it may be easily removed by heating the metal behind the cork with an alcohol lamp. When the adhesive becomes soft, the cork can be wiped off the key. As the metal heats, keep trying to remove the cork from the key: a key should not be overheated because this can cause damage to pads.

Cut a piece of cork a little larger than the area to be covered. It is a good idea to replace old cork with a cork a little bit thicker than that which was removed.⁷ The extra thickness can be cut or sanded to fit very easily, but too thin a replacement will usually result in having to do the job again.

To apply the cork, light an alcohol lamp or bunsen burner, and heat the surface to be corked on the opposite side of the key. As the key heats try to apply the shellac to the surface. There is no need to overheat the key. As soon as the shellac starts to stick to the metal, apply a smooth coat over the entire area to be covered by the cork. While the shellac is still soft, apply the cork

⁷Clayton H. Tiede, The Practical Band Instrument Repair Manual, (Mankato, Minnesota; William C. Brown Company Publishers, 1962), p. 71.

and use a damp cloth to press the cork tightly to the key as the shellac cools. Be careful so the cork does not slide from the desired position as the shellac cools.

After the cork is securely in place, use a very sharp knife to trim the cork. A gentle sawing action is best when cutting cork, and a slight taper is desired for a nice looking finish. A slight taper also helps prevent the cork from chipping.⁸ A piece of fine sandpaper or emery board works well to smooth the marks left by the knife.



FIGURE 3



FIGURE 4

Taper of Bumpcorks

Corking Woodwind Joints

Equipment needed:

Sharp knife

⁸Ibid., p. 55.

- Sandpaper
- Liquid cork adhesive or contact cement
- Sheet cork
- Cork grease
- Emery cloth

Scrape off the old cork with the blunt edge of a knife. After the old glue has been removed, use light sandpaper to roughen any slick surfaces in the area to be corked, thus providing a better surface for bonding. Refer to the first two paragraphs under "Corking Repair Keys" for more detail on preparation for corking.

Next, measure a strip of cork allowing about three-eighths of an inch for over-lap (lap joint) on one end. The width of the cork should be enough to fill the grooved area that is cut in most modern horns. Cut along the long plane of the sheet of cork to help prevent breaking while bending it around the horn. One end of the cork strip is tapered across the width as is mentioned in the chapter on "Re-corking Sax Necks." Next, apply cork adhesive to the underside of the lap area, and the area on the instrument to be covered. Then lap the tapered end of the cork on the glued area and proceed to wrap the cork around the instrument. Make sure it does not slip out of place because liquid adhesive is quite slick until it starts to dry. Be sure there is adhesive in the area where the cork overlaps.

Tie one end of a string to a solid object at a convenient height (three to three and one-half feet) long. Take the free end of the string and place it on one edge of the new unset cork and wind the string on the cork in the same direction as the cork is wrapped. Wrap the string on the cork evenly, covering

the total exposed area of cork, The tension on the string should be firm, but need not impress the cork deeply. Cut the end of the string that is tied to the solid object, and glue the free end of the string to any close area around the joint.

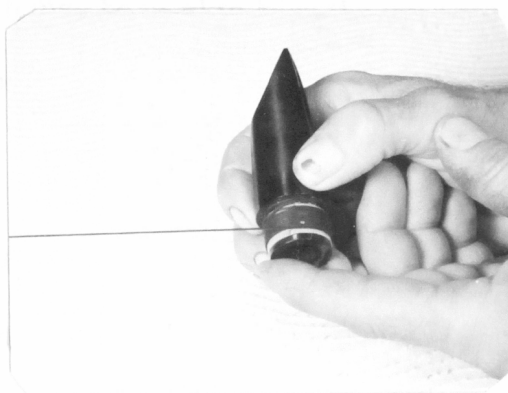


FIGURE 5

Securing Newly Glued Cork to Mouthpiece for Drying

Let the string remain on the cork at least twenty-four hours. If possible, do not try to work or finish the new cork for about forty-eight hours. Liquid cork glue dries slowly and it is better to let the adhesive dry hard enough to handle after the first application rather than to have to wait while a second glueing job has set. The use of a good contact cement will shorten the job greatly and eliminate the long timely delay. Directions for using contact cement are on the container.

The excess cork at the lap joint is cut off with a gentle sawing motion with a sharp knife. Work the roughness of the cork down with an emery cloth

but do not work the cork down too far . The cork should look a trifle large for the receiving joint .

Be careful to avoid damaging the new cork joint while trying to determine the correct fit by using cork grease when fitting the new cork joint . The joint should fit snugly with an application of good cork grease⁹ . There are many good cork greases which may be used to keep the cork from soaking up moisture and also to keep the cork soft and pliable .

Locating Pad Leaks

Equipment needed:

Feeler stick with a thin strip of cigarette paper about an eighth of inch wide
Cigarette for smoke
Soapy water and a small water color paint brush
Small piece of clean cloth
Rubber cork

There are a number of different ways to locate pad leaks in woodwind instruments and saxophones . The simplest method is to look closely at the pads of the instrument to see if the thin tissue on the skin pads is torn or pulled apart or worn through leaving the soft, felt cushion exposed in the seat area . If such damage is found, replacing the pads will usually create the proper response .

Another method used for locating pad leaks for smaller instruments is to close off all holes in a section of the horn. that would, if working, make

9

Ibid., p. 20.

the section air tight. By blowing into the opening and listening for the sound of escaping air, one can determine if that particular section is leaking. A rubber cork can be used to block one end of the instrument, leaving one hand free to press on different key cups that may stop the leaking air.¹⁰

Another method that works on most woodwind instruments is the use of the feeler stick. The feeler stick is inserted between the pad and the hole rim and then with average playing pressure on the key, the feeler is slowly withdrawn. The idea is to observe the resistance as the feeler of five different places around the pad. If the resistance is lighter in one area of the pad than another, the air leak has probably been located.¹¹

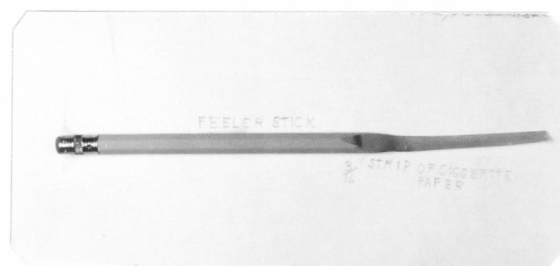


FIGURE 6

Feeler Stick

Another method that can be used to locate a pad leak is to block the far end of the horn with a rubber cork or a handkerchief. After closing the

¹⁰Brand, op. cit., p. 60.

¹¹Ibid.

suspicious keys and painting all around the holes with sudsy water, close all other keys or holes and blow gently into the open end of the horn and look for air bubbles. If there are no air bubbles around the suspected pad or pads, continue in the same manner with all the pads in the section. Be sure to wipe the soapy water off the horn when finished.

Still another method of locating a leak is by stopping all holes and blowing cigarette smoke into the horn; the leak will show where the smoke escapes. After using this method, be sure to wipe the smoke off the pad seat where the leak occurred or it will cause the pad to become sticky. The smoke can be cleaned off by gently pulling a clean damp rag through the pad and seat.¹²

Notes on Woodwind Instruments

If a cork joint becomes loose, a temporary cure is to coat the cork with a cork grease and then circulate the cork evenly over a flame, being careful not to burn the cork. The heat swells the cork making a tighter fit. This is only a temporary cure and the cork will have to be replaced to permanently cure the ill effect.¹³

Mouthpieces should never be left on the neck piece or in the barrel of a reed instrument. When they are left this way the cork is pressed tightly and the cork joint will soon become loose.

¹² Tiede, op. cit., p. 71.

¹³ Ibid.

Re-corking Sax Necks

Equipment needed or suggested:

- Alcohol lamp or bunsen burner
- Sandpaper
- Sharp knife
- Old metal fingernail file
- String, about three feet
- Adhesive
- Liquid cork bonding material
- Contax cement

Remove the old cork by using a lamp or burner to soften the shellac, removing cork while the shellac is hot, or by scraping the cork with the blunt edge of a knife. With either method the metal must be cleaned where the new cork is to be applied. Scrape the metal with the blunt edge of a knife until all traces of shellac are gone. Then use fine sandpaper to clean the metal more thoroughly.

Apply adhesive (shellac) by heating the metal over the burner, being careful not to over heat. Heat the metal only long enough for a smooth surface of shellac to be applied.

If using the cork tubing made especially for this purpose, fit it to the neck to make sure of proper fitting before applying the shellac. Then apply the shellac as in the above paragraph, slip the cork on the neck, and then direct the heat of the flame from the burner inside the corked end of the neck. Be very careful not to burn the cork. A little practice at directing the heat inside the neck of the sax before attempting the real job will prove very helpful.

When the shellac becomes soft under the cork and starts to squeeze out both ends of the cork enough heat will have been used. Allow the shellac to

cool, then remove the burned cork by cutting or sanding. While finishing the newly mounted cork, be careful not to remove too much cork. The taper should be finished so that the mouthpiece fits fairly tightly when placed about half-way up the cork.

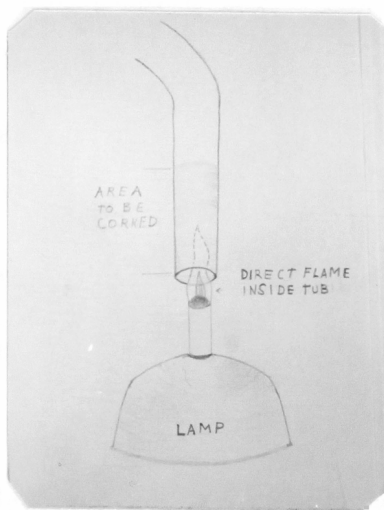


FIGURE 7

Directing Flame Inside
Saxophone Neck

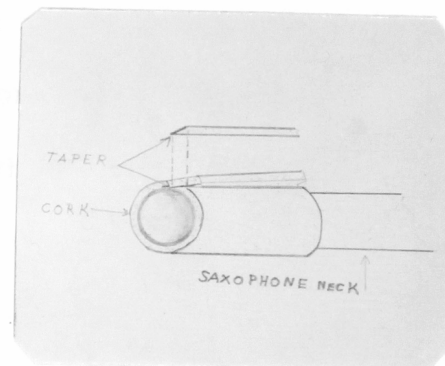


FIGURE 8

Corking Sax Neck Side View

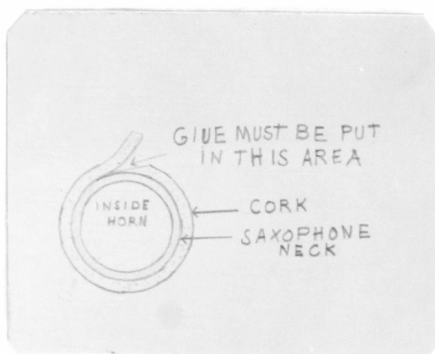


FIGURE 9

Corking Sax Neck End View

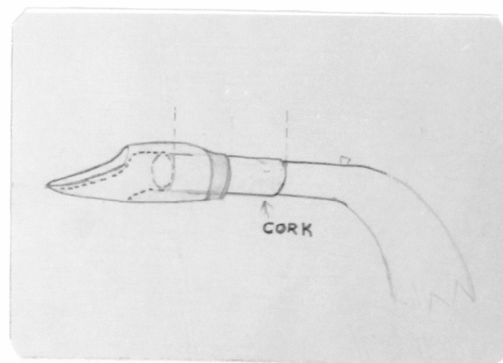


FIGURE 10

Fitting Cork to Mouthpiece

A second method of applying cork to a sax neck piece is done by using sheet cork. The cork is first cut into a strip about three-eighths of an inch longer than the full distance around the desired area to be covered. Because there is a slight taper to the sax neck, the larger end of the area to be corked will have to be accounted for in this measurement. The desired width for the cork can be measured from the old cork, or corked area of the sax with a ruler, and marked off on the sheet of new cork. Use a very sharp knife to cut the cork. The application of the shellac is the same as described in the first method, but before the shellac has a chance to cool, the strip of cork must be applied or the shellac will have to be reheated. When applying the cork to the neck pipe, one must make sure that the point of the taper that was cut at one end of the cork is flat on the neck pipe. Then proceed to wrap the cork around the shellaced pipe: this must be done quickly while the shellac is still hot and tacky. The section of cork that laps over on top of the taper will need to have some hot shellac applied to it. Do this by letting a few drops of hot shellac fall into the lapped area. Then, by heating an old metal fingernail file quite hot and running it through the adhesive, the shellac in the lap area can be spread evenly over the area to be bonded, and immediately press the cork firmly together until cool. After cooling, the cork is ready to be cut and finished as previously mentioned.¹⁴

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Frank Cummings and Carl Gulmann, Director and Student's Band Instrument Repair Manual, Clarinet, (Berkeley, California, Series I, 1952)

There is a third method of applying cork neck pieces which many people prefer. Removal of cork and preparation are the same as the other two methods but heat is not required and shellac is not used. A good liquid cork bonding material is applied to the area to be re-corked. If strip or sheet cork is used, it is a good idea to apply the bonding agent to the cork also. If cork tubing is used, it is a good idea to apply the bonding agent inside the tubing. Next, when using sheet cork, apply the adhesive to the lap area. Then wrap a long piece of string firmly around the cork from one end to the other, being careful not to let the cork slip. Secure the string and let the neck pipe dry for at least twenty-four hours in moderate house temperature. Then remove the string. Be careful when removing the string after twenty-four hours because any of the cork adhesive should dry and harden for three or four days. When using tubing, adhesive should dry and harden for about forty-eight hours before finishing. Usually after about forty-eight hours, if one is careful, the cork can be worked and fitted to the mouthpiece. The advantage of this method is that no heat is used and no cork is burned.

Wil Hold Contax Cement works very well for the amateur repairman. The drying time is only about ten minutes and then the cork may be finished.¹⁵

Preparation for the use of Contax Cement is the same as for other adhesives and instruction for the application of Contax Cement are usually on the container.

¹⁵ Personal correspondence with Mr. Donald Laudervil, Instrumental Teacher, Portland, Oregon.

Replacing Springs that Have Slipped Out of Their Groove on Reed Instruments

Equipment needed:

A modified crochet needle, size 7

Rubber band

Springs on almost any wood wind instrument can be put back in place quite easily by using a crochet needle, size 7 or a little larger. With a little modification of the needle, it becomes a very useful tool in any director's repair kit. File a small "V" in the pointed end of the crochet needle so the needle can be used to either push or pull the spring back into place. Sometimes a spring may need to be bent a little in order to apply more pressure, either to hold the pads open or closed. When bending a spring, try to bend it evenly and hold a kink or bend in one spot.

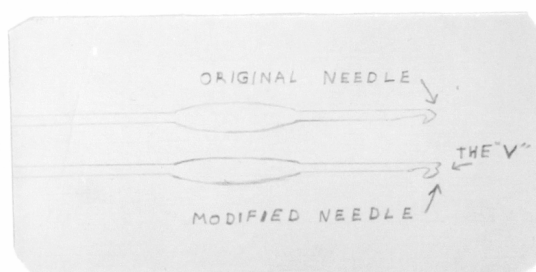


FIGURE 11

Modified Crochet Needle for Putting
Springs Back in Place

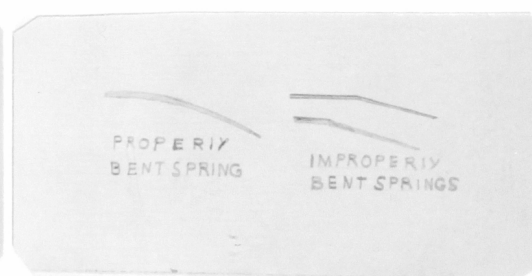


FIGURE 12

Springs of Woodwind
Instruments, Bending

If a spring breaks on a woodwind instrument and there is no chance of

repairing or replacing it, a rubber band may be used for the emergency. The rubber band will have to be substituted for the broken spring so as to operate the key mechanism as the spring did. Be careful so the rubber band will not interfere with other working parts of the instrument. The rubber band should be replaced with the correct spring as soon as possible ¹⁶



FIGURE 13

Rubber Band for Temporary Replacement of Broken Spring

Re-padding With Skin Pads

Equipment needed:

- A feeler stick
- Alcohol lamp or bunsen burner
- Adhesive, either stick shellac or cement
- The correct assortment of pads
- A pad slick
- A clean rag

¹⁶ Personal correspondence with Mr. Alvin Salveson, Instrumental Teacher, Deer Lodge, Montana

If one has the time when repadding a key of a wind instrument, it is best to take the key from the body of the horn, then by heating the bottom side of the cup to soften the shellac or cement, the old pad can easily be removed. The old adhesive should be clean out of the cup by wiping with a small object.



FIGURE 14

Heating Pad Cup to Soften
Shellac Adhesive

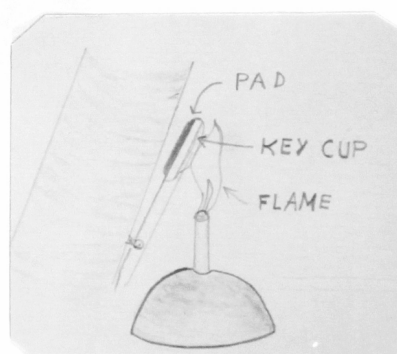


FIGURE 15

Heating Pad Cup to Soften
Shellac Adhesive on Body
of Instrument

Then apply a few drops of adhesive to the key cup. If, when removing the old pad, one is careful to observe its thickness, it will help in the selection of a new replacement for a particular key. Select a pad of the desired thickness which fits into the cup fairly snug. Next, heat the bottom of the cup until the adhesive becomes soft and place the pad in the cup properly. Lay the pad slick flat on the surface of the pad and press the cup and pad slick together slightly.

This will give the pad a smooth, flat surface .



FIGURE 16

Pad Slick, Use of to Flatten Surfaces of Pad for a Proper Fit

After cooling, fasten the key back on the instrument and check the pad seating with feeler paper . If the pad does not touch the seat evenly all around, the pad will leak and cause the horn to be faulty . Many times this trouble can be corrected by carefully heating the pad cup on the horn until the adhesive softens, and then by applying a gentle amount of pressure to the bottom of the cup, the pad will shift to a proper fitting . It is suggested that a rag be used to apply pressure between the cup and the pad seat to prevent any possible finger burns .

Professional repairmen often bend the keys in order to make the pad seat properly but this procedure is not recommended to the amateur repairman . The keys of some cheaper horns are made of a pot metal and any bending could result in a broken key .

A pad with a broken covering can be used for a short while if it is recovered with a disk of aluminum foil cut to the proper size and cemented in place. Gentle pressure on the top of the cup, and a little heat will reseal the pad.¹⁷

Pads will last much longer if they are kept clean, but do not clean them with anything that will take out their natural oils. A damp clean rag placed between the pad and the pad seat will clean pads fairly well if the pad is pressed gently shut and the cloth pulled carefully from between the pad and the seat.

A ronson propane cigarette lighter with an adjustable flame has been found to be a very helpful addition to an instrumental teacher's repair kit, especially when heating adhesive in pad cups of woodwind instruments.¹⁸

¹⁷ Roy Markel, "Instrument Care and Repair," Instrumentalist, October, (1962), p. 22.

¹⁸ Correspondence with Ephram Hackett, Instrumental Teacher, Klamath Falls, Oregon.

CHAPTER II

BRASS INSTRUMENTS

Cleaning the Inside of Brass Instruments

Equipment needed:

- Flexible brush
- Clean water
- Soap
- Clean rags

When attempting to clean the inside of a brass horn, one needs a large quantity of lukewarm water, soap, clean rags, and a flexible brush. If the instrument has developed a puissant odor, castile soap should be added to the water, or use one teaspoon soda for each gallon of water.¹ For smaller instruments it is preferable to submerge the horn in the water. All slides should be pulled out of the horn before placing it in the water, and piston type valves should also be removed. It is not a good idea for the amateur to disassemble rotary valves on such instruments as the French horn or tuba; this should be left for the competent repairman. A bass horn with no lacquer on it can be left to soak in the water for a short time before proceeding with the cleaning. Instruments that have lacquer on them may be left a short time in water that does not exceed 100 degrees, but prolonged soaking will loosen the lacquer.

1

Recommended by Dr. Lloyd Oakland, University of Montana

On smaller instruments, such as the trumpet, a flexible brush should be carefully pushed through all the piping which the brush can easily pass through. Be careful when using these brushes in the valve casings in order to avoid scratching any buffed or polished surfaces.

On larger instruments, the trombone brush should be used to clean out the tubing. It is a little unorthodox, but many sousaphones have been cleaned out in the gym shower. Working in the shower with the larger instruments works well because of the abundant supply of water. Always use cool water, and do not direct too much pressure to the lacquered surface of the instrument.

The bell of the sousaphone should be taken off the body of the instrument along with all other easily removable parts. After filling the body of the sousaphone or tuba with water, it should be cleaned with the flexible brush and then all the water should be removed. After cleaning all the tuning slides and the horn, the tuning slides should have a light application of Vaseline and then should be put back into their proper places and moved in and out a few times to make certain that they move easily.

The French horn is a difficult horn to clean because of its long, small bore tubing. Many teachers have found that by cutting several feet from a garden hose and inserting the cut off end of the hose up the bell of the horn, water can be flushed through the horn, thus forcing most of the dirt out of the mouth pipe. Hold the water hose tightly and carefully in the bell, but do not shove or push it up the bell so forcefully as to cause visible distortion to the soft metal of the bell piping. Caution: too much water pressure with valves

pushed out may shove out a slide and injure it .

Cleaning the Outside of Lacquered Instruments

Materials needed:

- Warm water
- Clean rags
- Flexible horn brush
- Silver polish

Lacquered instruments can be thoroughly cleaned by carefully disassembling the horns after first noting the proper placement of all parts . Then, by placing all the parts into soapy, lukewarm water, one should be able to wash off most of the dirt and old grease with some soft, clean rags and a flexible horn brush. The temperature of the water must not be hot because high temperatures will loosen the lacquer on the instrument. Lukewarm water, below 100 degrees Fahrenheit, will not damage the instrument .

Soap containing an abrasive should not be used because it will scratch the instrument, and if not rinsed very carefully, may leave small abrasive deposits that will harm slides and valves . There are many commercially made products that clean and protect the lacquer of an instrument, and the use of such lacquer cleaners and waxes will help extend the life of the finish of the horn . Silver polish is commonly used to clean the outside of unlacquered instruments .

Many articles on cleaning instruments suggest the use of carbon tetrachloride as a cleaning agent for grease, but the use of this chemical has been found to be quite unhealthy unless used where there is a draft and plenty of fresh air . However, this chemical does clean well .

One way in which heavy grease or heavy oils may be removed is by applying a liberal amount of clean, light oil on a rag and rubbing the greasy area with the oiled rag.

Lubricants and Oils for Tuning Slides

Materials needed:

Vaseline
Rig Universal Grease
Cold cream
Carbon tetrachloride

There are many fine prepared oils and greases on the market for the purpose of lubricating tuning and valve slides. There are also a few lubricants not specifically manufactured for use on instruments, but which work very well.

One such lubricant is Vaseline which can be used to clean dirty slides and also for lubricating purposes. A second lubricant that is very good is Rig Universal Grease which comes in small tube containers for convenient use.² Mutton tallow and cork grease can also be used as lubricants.³ Cold cream is a good lubricant that can be used on brass instrument tuning slides. In the book, The Art of French Horn Playing, Mr. Farkas states the best slide lubricant that he has found is gun grease.⁴

² Recommended by Mr. James Eversole, former Head of Bands, University of Montana.

³ How to Care for Your Instrument, (Conn Corporation, Elkart, Indiana, 1942), p. 6.

⁴ Philip Farkas, The Art of French Horn Playing, (Evanston, Illinois: Summy-Birchard Publishing Company, 1956), p. 8.

Carbon tetrachloride is a very good cleaner for slides but this chemical is toxic and prolonged inhaling of its fumes may be harmful. Use carbon tetrachloride with plenty of ventilation and fresh air. After cleaning with carbon tetrachloride, apply a good lubricant. Valves and slides may be cleaned effectively by immersing them in pure vinegar from one to eight hours.⁵ Cleaning slides with such methods as steel wool (0000 grade) or rotten stone are good but they are somewhat harsh and their indiscriminate use would be harmful to the life of the horn. They should be left to a competent repairman.

Removing Jammed Mouthpiece

Equipment needed:

Mouthpiece puller
Plastic headed hammer
Penetrating oil

Never try to remove a jammed mouthpiece with a pair of pliers. Damage usually results from this procedure; furthermore, the mouthpiece is seldom removed in this manner. A leather belt can be wrapped around the jammed mouthpiece, then by carefully applying pressure with pliers, the ferrule is tapped. This may require the help of another person, but the procedure rarely fails.⁶

One might try the following suggestion if the above method does not work.

⁵ Recommended by Dr. Lloyd Oakland, University of Montana.

⁶
Ibid.

Apply a little leverage between the horn and the mouthpiece with the palm and fingers of one hand, making sure that the horn is held in such a way as not to fall or drop if the joint loosens. Then, with a plastic or rawhide hammer, tap the ferrule with a few sharp blows. The idea is to deliver a sharp tap rather than a heavy blow.⁷

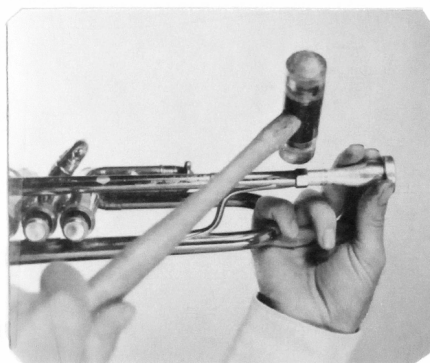


FIGURE 17

Stuck Mouthpiece, Loosening of

Another method which may work is the use of a mouthpiece puller, which can be purchased from most music supply houses. This will be a valuable aid, especially where many beginning students are playing brass instruments.⁸ Instructions usually accompany a new puller. While applying pressure with the puller, sharp taps from a plastic-headed or rawhide

⁷Clayton H. Tiede, The Practical Band Instrument Repair Manual, (William C. Brown Company Publishers, 1962), p. 6.

⁸Ibid.

hammer may help to loosen the joint. The sharp taps should be administered to the receiver of the mouthpieces.

A good penetrating oil should be applied to the stuck mouthpiece at the point where it goes into the mouthpipe. It is also a good idea to put a few drops of penetrating oil or kerosene down the far end of the mouthpipe while holding the pipe in a vertical position, mouthpiece down. The idea is to get penetrating oil working at both ends of the stuck mouthpiece. Letting the horn sit for a few hours with the oil working on the stuck parts often makes the pulling job much easier and may save damage to the horn.

There are cases where the mouthpiece puller will not work. If this is the case, there is a remedy that a sure and steady-handed person may try. Oil the joint with penetrating oil as mentioned above and let the horn sit a few hours. Then lay the mouthpiece ferrule on a solid block of wood in such a position that the cup of the mouthpiece is free. Use a plastic-headed hammer to strike the collar (or ferrule) of the mouthpipe, meanwhile rolling the instrument over while tapping in order to loosen the mouthpiece all around inside the collar. Use sharp, short taps with the hammer because a heavy blow may cause damage. Be very careful to strike only on the ferrule because a tap at any other place may bend or dent the mouthpipe. This method will usually loosen the most rigidly jammed mouthpiece.

If the previously described methods of removing the mouthpiece do not work, the horn should be taken to a competent repairman.

Occasionally a mouthpiece will be found that is a chronic sticker. In

such cases, rub a thin coat of candle wax on the area of the mouthpiece that is inserted into the horn after it has been cleaned.

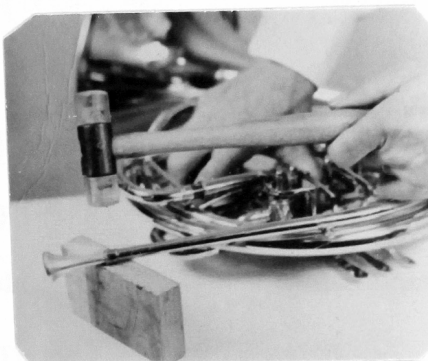


FIGURE 18

Stuck Mouthpiece, Loosening Of

Removing Stuck Instrument Slides

Material needed:

Fine lubricating oil
 Piece of cotton rope
 A small hammer

If a slide will not come out with good finger pressure, inspect the slide for possible dents. If dented, the horn should be sent to a repairman. Further efforts to remove the slide should be tried after the possibility of dents has been ruled out.⁹

⁹Roy Markle, "Instrument Care and Repair," The Instrumentalist, (November 1962), p. 12.

One method used to remove stuck slides is to loop a rope through the slide with the two loose ends of the rope held firmly in one hand and the horn in the other. A series of short jerks on the rope in the opposite direction of the horn will often loosen the stuck slide. Do not use strong arm methods to get slides loose.¹⁰

Another method is to apply a good penetrating oil or kerosene to the slide. If possible, apply oil at both the inside and outside portions of the slide, and let the horn sit about half an hour in order that the oil may work its way into the slide. Then proceed as in the above method. If this method fails, it would be better to let a competent professional repairman remedy the trouble.

There is a third possibility in removing a stuck instrument tuning slide, but it is not recommended because of the possibility of injury to the slide. If this method is used, extreme caution must be exercised. Insert a well-padded handle of a hammer or a similar tool into the loop while holding the far end of it. Tap in the direction that the slide must go to come loose from the body of the instrument. Many times this procedure will flatten the inside of the loop of the stuck slide, so padding and caution are extremely important.

After the slide has been removed, clean all the corrosion from both the male and female tubes. Gasoline or metal polish works well, but do not use

¹⁰ How to Care for Your Instrument, (Conn Corporation, Elkhart, Indiana 1942), p. 6.

abrasives. Use plenty of warm, soapy water. A long piece of cotton cloth about three inches wide and thirty to forty inches long with a weighted string¹¹ tied securely to one end can be drawn through the tubing. Fishing sinkers of various sizes make good weights.

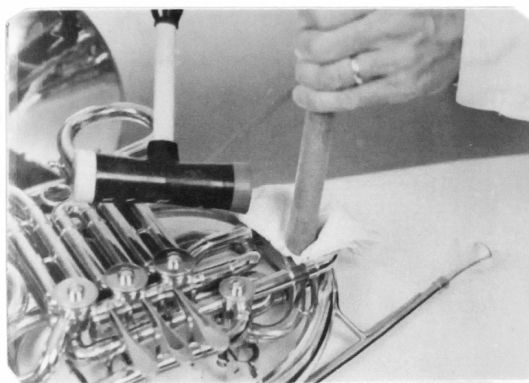


FIGURE 19

Stuck Tuning Slides, Loosening of

After the slide has been removed and both parts cleaned, apply a good grease such as Vaseline, Riggs, or other commercially made grease to the slide. Insert the slide in the receiver end and work the grease well, thus putting a protective film of grease between the two parts.

Removing Stuck Valves

Penetrating oil may be used

Sometimes a valve is stuck from a dent in the casing. Loose mouth

¹¹ Ibid.

pieces in an instrument case will often cause this damage . If it is known that a valve is stuck from a dent in the casing, the best solution would be to seek the talents of a competent repairman .

Piston or rotary valves that become corroded and stuck in the casings can sometimes be loosened by first applying penetrating oil into the cracks around the valve and casing from both the top and the bottom . After waiting for the penetrating oil to soak in for a few hours, the finger button may be struck gently with the palm of the hand . Do not use a hammer for striking the finger button because of possible danger of breaking out the pearl or bending or damaging the valve .¹² Valves that are stuck so tightly that they need to be driven out of their casings should be taken to a good repairman .

On silver horns or horns that are not lacquered, a valve stuck from corrosion might be removed or loosened by soaking it in hot water for a while and then striking the finger button as previously mentioned .

After a valve has been loosened and freed, take the valve out of the casing and clean both parts thoroughly . Make sure all foreign material is washed away before re-assembling since even the lint from rags will often cause a valve to stick .

Replacing Valves in Instruments

When replacing valves in an instrument, be careful to place each valve

¹²

Erick D . Brand, Band Instrument Repairing Manual, (Elkart, Indiana, 1946), p . 155 .

in the right casing. On some instruments, the casings are numbered consecutively to correspond with the correct valves, but many times the casings are not numbered and the valves are labeled. In most valve instruments, the valve being pushed by the first finger of a player's hand is considered valve number one, with the second, third and possibly fourth valves following in order. On some instruments, the valve number is marked on the valve stem, or it may be found at the top of the valve stamped in the plate near the stem.

After the valve and casings are matched, be careful to insert the valve in the casing correctly. Many horns have a guide slot starting inside the top of the casing and extending down about an inch or more. The valve may have a small protrusion that matches the casing slot, and this type of valve and casing usually do not cause trouble when assembling. Some valves have their guide slots built into the valve stems. On this type of valve there are usually small pieces of metal (part of the valve guide mechanism) in the form of a ring

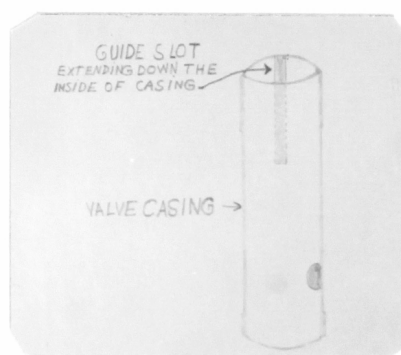


FIGURE 20

Guide Slot of Valve Instruments

or a mechanism that has two to three fingers extending beyond the valve width. One of the fingers is usually wider than the other one or two. If one looks carefully into the casing, there will be a corresponding notch that is wider, enabling the casing to receive the valve properly. When the ring is used, there is usually one small notch in the casing that matches with a small protrusion extending down from the ring beside the valve. When inserting the valve, it will be necessary to turn it slightly until the notch and lip match.

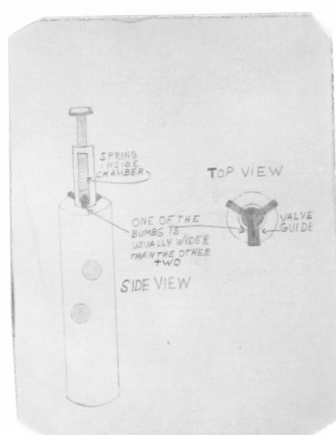


FIGURE 21

Guide Mechanism of Some Types of Valves

Be careful with horns that have springs underneath the valves. Sometimes the springs will become weak on one side due to their continually being depressed and they will rub the casing wall. This spring rub, if neglected very long, can cause a valve to leak. Use only good, evenly matched springs in horns. Make sure that all springs are square at both ends so they sit

straight up and down when placed upright on a level surface.¹³ Springs are inexpensive items, and should be examined periodically and replaced if signs of wear are shown.

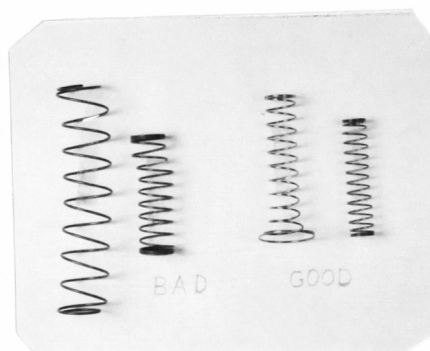


FIGURE 22

Springs, Correct and Incorrect Valve Instruments

Sticky or Dragging Valves

Materials needed:

- Clean rags
- Clean lukewarm water
- Valve oil
- Alcohol
- Chemistry type test tube brush
- Soap

If valves in an instrument persist in dragging or feel sticky, and the cause is not a dented or damaged casing, the valves and the valve casings should be washed with soapy, lukewarm water with the aid of a test tube brush.

¹³
Ibid., p. 157.

When dry, a clean rag saturated with alcohol can be wiped over the sliding areas to remove any bits of old oil or grease that may not have been freed by washing. Students that do not clean or take care of their horns regularly would do well to avoid using any type of valve oil. Most oils gum up with continued usage; consequently, the valve action becomes sluggish. Water works well as a lubricant in the situations just described.

Another method that works well is that of adding approximately one part valve oil to seven parts water for use on valves. Shake the mixture well before each application and add a few drops to each valve; however, students must be careful with the mixture, as the oil will spot clothing. This oil mixture works better than just clean water, but careless or playful students are not as apt to harm or spot clothing with clean water.

A plastic bottle with a lock spout for the water has been found to be very satisfactory for classroom use. A window spray mechanism in a plastic bottle is also very handy to have in an instrumental classroom for use on trombone slides.

Storing Instruments

Storing space
Rags and Vaseline
Clean water

Brass instruments should be cleaned inside and outside before being put away. All the sliding parts, such as tuning slides and valves, should have a coat of Vaseline. The Vaseline prevents corrosion that often collects in moist or salty climates. This corrosion will often damage valve action if not removed.

The slide of the trombone can also be protected in storage by applying a heavy coat of Vaseline. The Vaseline should be removed from the valves and casings before the horn is restored to playing condition.

French horns or rotary valve instruments should be washed out thoroughly and then oiled through the tuning slides onto the valves. Rotary valves on a good French horn are placed in position very precisely, and the less they are tampered with by amateurs, the better they will work. The caps on the bottom of the valves are easily removed, exposing one end of the valve action and oil can be applied at this point. The strings of a rotary valve horn should be checked for wear and any that are badly frayed or worn should be replaced before storing.

The time spent in preparing an instrument for storage can also serve as a good time to check a horn for needed repairs. Major repairs should be listed, and, if possible, the instruments should be sent to a competent repairman. Minor repairs should be listed and taken care of before the instruments are stored.

The following check list is suggested as a guide when placing brass instruments in storage.

I. Brass Instruments

A. Clean inside and outside before storing them

B. Give sliding parts a coat of Vaseline

1. Prevents corrosion in moist or salty climates which may damage valve action
2. Protect slide of trombone in storage with heavy coat of Vaseline

3. Remove Vaseline from valves and casings when horn is restored to playing condition

II. French horn and rotary valve instruments

- A. Wash thoroughly and oil through the tuning slides onto the valves
- B. The rotary valves on French horns should not be tampered with by amateurs
- C. Remove the caps on the bottom of the valves and oil the exposed end of the valve action
- D. Check strings rotary valve horn for wear and replace badly frayed or worn one before storing

III. Use time spent in preparing instruments for storage to also check for needed repairs

- A. List major repairs and send the instrument to a competent repairman
- B. List minor repairs and take care of them before storing instruments

Trombone Slides

Checking trombone slides for dents is a little easier if a single thickness of a handkerchief or similar material is placed on the outside of the slide. By gently rubbing the handkerchief over the slide with the finger tips, one should be able to detect irregularities in the surface.¹⁴

For breaking in the slide of a new trombone, it is suggested that the oil that comes with the instrument be used. After the breaking in period of about

¹⁴

Personal correspondence of the author, with Mr. Edmund Sedivy, Director of Bands, Montana State University.

six months, a cold cream such as Pond's or Cuticura ointment may be used.¹⁵

To apply Pond's cold cream or Cuticura ointment, first clean the sliding areas thoroughly, then apply the ointment or cold cream with the hand to the inner slide so there is a thin, even coat over the entire sliding surface. Rub the coating in so the hand creates a little heat by friction when applying, and then use an atomizer or similar device to spray water on the slide for the lubricant. The cold cream or ointment with water gives a smoother, faster action than oil. The application will have to be repeated as the base washes off in the water spray. One application generally lasts one to two weeks.¹⁶

It is very necessary that the slide of a trombone be lubricated each time it is used, either with the method just described or with trombone oil. Three things contribute to a short-lived trombone slide: failure to keep the slide properly lubricated; failure to keep the slide clean; and dents.

The Tuba -- Sousaphone

When placing a sousaphone on the floor, it is a good idea to lay the instrument down with the valve stems facing up and the bell facing parallel with the floor. Many times a sousaphone is placed on the floor with the bell down and with the body weight of the instrument resting on one tube of the third valve mechanism. Carelessness in setting the horn down in this manner will soon result in

¹⁵ Personal correspondence with Mr. Dean Vinal, Director of Music, Hamilton, Montana.

¹⁶ Ibid.

a partially closed area of tubing in the third valve section of the instrument.



FIGURE 23

Sousaphone, Improper Way of
Laying Instrument Down



FIGURE 24

Sousaphone, Proper Way of
Laying Instrument Down

The outside of silver instruments can be cleaned with silver polish. Lacquered instruments may be cleaned by wiping with a rag and soapy water. After cleaning, dry all surfaces with a soft, dry cloth to prevent streaking. The inside of the instrument can be cleaned out with the aid of trombone brush and a large amount of water. All the slides and valves of the instruments should be removed and the trombone brush and water should be used to clean out all the slides and smaller accessible tubing of the body. Cleaning out the inside of the tuba or sousaphone may be done very conveniently in a school shower. Caution: hot water must not be used on lacquered instruments. After the instrument is cleaned and rinsed inside and outside, it should be wiped with a soft, clean rag to avoid water spots. The valves should be cleaned very thoroughly and replaced in the proper casings. All slides should be greased with a suitable lubricant and replaced in the horn.

Here are some suggestions that may help in the removal of foreign material from the sousaphone. Remove the bell and extend the arm into the large end of the horn as far as possible. If the material cannot be reached, the following method may work. Many times, by using a small screw type sewer pipe cleaner, the twisting action of extending this tool into the horn will grasp the foreign material, and the obstruction can be removed. If this method does not work, one may try the following suggestion: pull the tuning slide out of the instrument and hold the end of a garden hose to the proper tubing in such a way that it will not mar or scratch the finish; then turn on a good amount of water pressure. By holding the water hose to the proper piece of tubing, it may be possible to force the object out of the horn with water pressure. If this method does not work, the job should be given to a competent repairman.

There are many fine sousaphone chairs being manufactured and they do their job very well. Here is an idea that will make them more mobile and comfortable. The seat of many of these chairs is built a little low, and they are hard to move about or position while the player is sitting in them. These two problems can be solved by fastening two pieces of two-by-four, nineteen inches long, one in front and one in back, the full distance of the chair legs. Usually, fastening the two-by-fours to the bottom of the chair legs presents a problem, but small pipe brackets work quite well for this purpose. Next, acquire about eight furniture skidders and place two of these on each end of the bottom of the

two-by-fours. This prevents marking the floor as the chair is moved with the player sitting in it.¹⁷

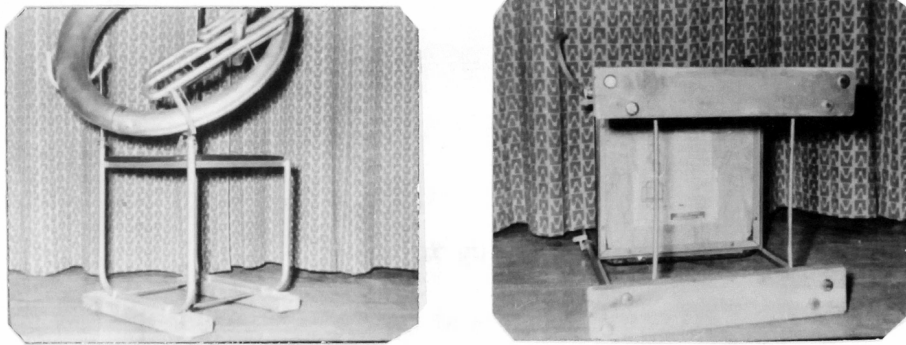


FIGURE 25

Sousaphone Chair with Added Height and Skidders

¹⁷ Personal correspondence with Mr. Rolf Johnson, Montana State University, Bozeman.

CHAPTER III

PERCUSSION INSTRUMENTS

Drum Hints

Equipment needed:

- Clean rag
- Drum key
- Water
- Soap
- Striped old drumhead or gummed tape

Changing heads of a drum is a simple matter if one is observant while removing the old heads. There are two methods of tightening a head that has been newly mounted on a drum shell. The first method used employs a "cross method." One tension rod is tightened, and the next rod tightened is the one directly across the drum head from the first. Then move to a rod

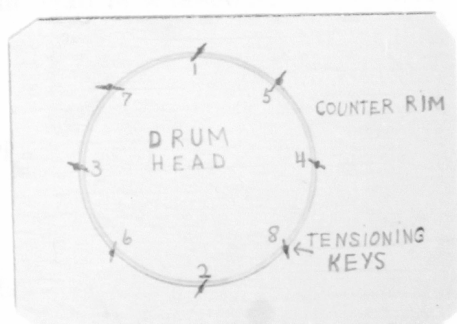


FIGURE 26
Drumhead, "Cross Method"
of Tightening

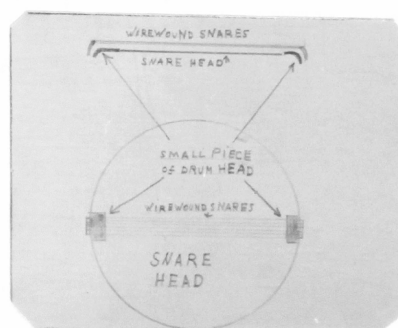


FIGURE 27
Snarehead, Protecting
from Wirewound Silk
Snares

midway between the first two rods tightened and turn it, down, then go across the head to the opposite side. This pattern continues until all the rods are tight and the head is at the desired tension. The second method used by many people simply starts with one tension rod and goes around the drum head consecutively, until all rods are tightened as desired.¹

With both methods, one has to be careful when tightening, for each rod is only tightened from one-half to one whole turn before proceeding to the next. This is continued until the head is pulled to the desired tension. Be careful when mounting a head to prevent it from being tightened unevenly.

At least once a year, the hoop should be removed from the batter side of a snare drum to remove the dirt that collects between the head and hoop. This dirt tends to cut a good head if not cleaned out. Plastic heads can and should be cleaned by washing with soap and water. Skin heads can be wiped off with a damp cloth, but it is a good idea not to use water on them. However, if a skin head is washed and gets quite wet, the tension rods should be loosened a bit while the head is drying. After the head dries, the tension can be reapplied.

Many times an old calfskin head will be good, but will be pulled down too far on one side. Before putting the drum back together, take the head off the shell and soak it in water for ten to fifteen minutes. This soaking will soften

¹ How to Care for Your Instrument, Conn Corporation, (1942), p. 29.

the head and when remounting, it can be tightened evenly. Important: when mounting a wet skin head, do not tighten it. Secure the hoop down on the head a little, making sure it is even and if it is too tight when wet, it is likely to split while drying.

Wirewound silk snares have a tendency to cut the head at the edge of the shell. This damage to the head can be eliminated to a degree by glueing a small strip of old drum head on the spots where the damage is located. Elmer's glue works well. One can either remove the snares while doing this, or loosen the snares quite a bit and slip the piece of material under the snares. The material should be wide enough that all the wires of the snare lay across it. A strip of gummed tape will also work.²

Tension on good gut snares should be loosened a bit if they are to be out of use for a while. Do not loosen them to the point of floppiness.

Repairing and Cleaning Turkish Cymbals

Equipment needed:

- A small hand drill or a quarter inch electric drill
- A small sized metal bit from about one-eighth inch to one-fourth inch size
- A small center punch
- Vinegar
- Water

Cymbals develop cracks occasionally, which are often caused by poor metal or abusive use. If a crack is not repaired, the cymbal will continue to

²Ibid.

crack until it is beyond repair and of no use.

A small crack can be checked if a hole is drilled in front of the crack. Before drilling the hole, a center punch should be used to mark the spot where the hole is to be drilled; this helps prevent the drill from slipping. The center punch should be slightly to one side of the direction of the crack. This is to prevent further cracking caused by center punching. If possible, it is wise to put the hole about one-eighth inch in front of the crack and very slightly to one side of the line of the crack.³

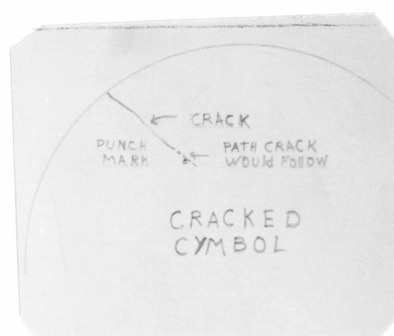


FIGURE 28

Cymbal, Placement of Punch Mark for Drilling

There is another method that is used by the professional repairman. This method makes use of a jeweler's saw to cut the crack out of the cymbal. However, this fine metal saw is a tool that is not usually available for band

3

Erick Brand, Band Instrument Repairing Manual, (Elkhart, Indiana; fourth edition 1946), p. 179.

directors' use .

Cymbals can be cleaned by soaking them in vinegar and later wiped clean with clean water .⁴ Do not clean cymbals with abrasives .

4

Clayton H. Tiede, The Practical Band Instrument Repair Manual, (Mankato, Minnesota: William C. Brown Company, 1962), p. 117, 118.

CHAPTER IV

STRING INSTRUMENTS

Refitting the Bridge to a Violin

Equipment needed:

Medium and fine grained sandpaper
Water

The following material is not meant to be a detailed dissertation on how to fit a new violin bridge. The purpose is merely to give an emergency solution to a bridge that has fallen down or one that does not fit the top of the violin properly.

Loosen the strings to such an extent that they may be slipped off the sides of the bridge easily. If the bridge feet do not make full contact in the proper area of the instrument, a square of fine sandpaper should be placed, grit side up, on the area where the bridge is to sit. Next, the bridge is placed on top of the sandpaper in the correct position. While holding the sandpaper with one hand, the other hand holds the bridge in the correct position and slides it back and forth lengthwise of the instrument. The movement should not be over half an inch, otherwise the feet will be sanded improperly for the correct resting place. While sanding, the bridge should be tilted ever so slightly back toward the tailpiece. Sand a few strokes and then remove the sandpaper. Wipe off the feet of the bridge and check for a good contact. Continue this procedure until a good fit is achieved.

The little notches carved on the inside edge of the "F" holes of the instrument serve as a guide for the placement of the bridge. The feet of the bridge and the notches should be in a direct line across with the side of the bridge facing the finger board. The bridge must be adjusted from side to side so that the strings hover over the finger board properly.

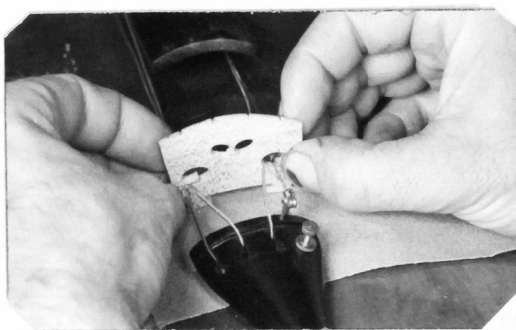


FIGURE 29

Bridge, Sanding for Fitting



FIGURE 30

Bridge, Sanding Showing the Tilt Which in the Picture is Excessive

It has been found that after fitting the feet to the top of the instrument, a drop of water added to the bottom of each of the feet before assembling will give them a more precise fit.¹

Reglueing Finger Boards

Equipment needed:

Violin glue
Long strip of rubber inner tube

¹Sherl E. Roth, You Fix Them, (Cleveland, Ohio, Third Edition, 1959), p. 10.

From Gordon Childs, Assistant Professor of Music, Adams State College, comes this very helpful suggestion. When reglueing finger boards, use a strip of rubber (old inner tubes work very well as a source) about an inch to an inch and a half wide and about two feet long. After the neck is cleaned and new glue applied, the rubber strip should be wound tightly around the neck and finger-board from the body of the violin to the peg-boy where it can be secured around a peg. The tension of the rubber not only works as a clamp to hold the finger-board against the neck, but also almost automatically aligns the edges of the fingerboard and neck. This prevents the fingerboard and the neck from being crooked as so often happens when wood clamps are used.

Any glueing on a string instrument must be done with a special animal glue that has to be heated before using. Most glueing should be done by a competent repairman.

Storing String Instruments

Stringed instruments should not be left in storage with their strings taut. The strings should, however, have some pressure on them. Stringed instruments are best stored in cool, but not damp, rooms. They should not be subjected to extremes of heat or dry atmospheres.

Strings

The strings of the orchestral string family should be wound on the pegs in the following manner. The string should be wound across the top of the peg in such a way that, as the string is being tightened, it will have a tendency to

move toward the peg head. Care must be exercised to avoid the string actually riding on the wall of the peg box for much of this would soon destroy the peg and weaken the peg box.²

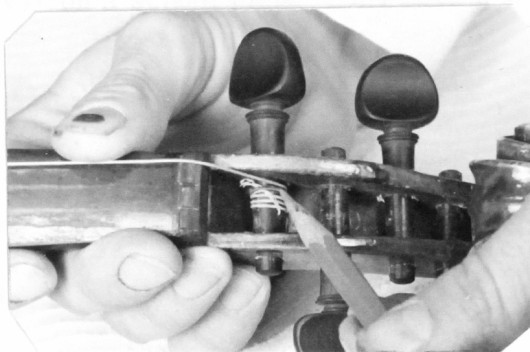


FIGURE '31

String Being Wound on Peg

The low "G" string is wound on the first peg, (the one closest to the body of the instrument); the next peg is on the right side and the high "E" string is wound on it; next the "D" string; and lastly the peg nearest the head of the peg box is the "A" string.

²Ibid., p. 26

CHAPTER V

THE SCHOOL PIANO

Keeping a dust cover on a school piano helps keep a lot of dirt and scratches from collecting. A piano dust cover should be made of material that breathes. If nonbreathing materials are used, a build up of dampness and mold may result. Materials used for dust covers should have a soft texture, at least on the side that comes in contact with the piano.

The keyboard cover should not be closed. Closing the keyboard cover prevents air from circulating around the keys; this may also result in an accumulation of dampness and/or mold.¹ Many times in our schools the keyboards have to be locked to protect the piano from student tampering, but if it is at all possible to leave the keyboard open, it is best to do so.

An occasional coat of polish for furniture wax will prevent ink and many other liquids from staining a piano.

Piano keys that are dirty may be cleaned easily with a damp cloth.² Then wipe the keys dry after removing the dirt. Do not use a dripping wet rag to wash off the keys because drops of water will run down between the keys and

¹ Conversation with Mr. Bill Gandrud, piano repairman and tuner, Dillon, Montana.

² Correspondence with Mr. Rudolph Wendt, Professor of Piano, University of Montana.

soak into the soft wood which may loosen the glue holding the ivory . There is a popular idea that leaving the water on the ivory keys tends to yellow them . Do not use alcohol to clean piano keys because it is very harmful to some types of plastic key coverings .

Tuning a piano is a delicate job and one that requires much training . Many times a school practice piano will develop a note or two that is badly out of tune . There are three strings to each tone on the notes in the high and middle range of the piano, and any or all of these strings may loosen resulting in a bad note .

If the instructor possesses a piano tuning wrench and with the aid of felt or rubber mutes and some patience, the bad note or notes may be brought back into pitch . Usually you must remove the top and upper front cover of the piano for easy accessibility . Stop either two adjacent strings from vibrating when the hammer strikes them by placing mutes in the space between the two strings . Tune the free string to an in-tune octave if possible, and after this has been accomplished, tune each of the other two strings to the first string . It may not be perfect, but often a bad note can be made a little better . Very little movement is needed on the tuning wrench handle and a person should try to move the handle in very tiny jerks rather than trying for a smooth steady pull .

Deeply grooved felts, (grooved beyond the diameter of the piano strings) will distort the note corresponding to that particular hammer and a repairman or good tuner should be consulted .

One very important point that should be brought out about pianos is

humidity. Many piano repairmen contend that a great number of pianos are ruined because of this one factor. In Montana, at our varying altitudes, a hydrometer reading of from thirty to seventy at seventy degrees should be maintained. This figure may vary according to temperature, but it is a close estimate. The hydrometer reading should never be allowed to go beyond a low of thirty in our comparatively dry climate.³

Piano Coaster Cart

If a piano has to be moved around very much, a good free running coaster cart under the piano will prevent much physical strain while moving the piano. It also prevents the piano from being bounced or vibrated out of tune so fast. Special double rubber wheels should be used on the coaster cart if it is to be used on cement.

If a wheel of a coaster cart becomes flat on one side, it is best to change it. Flat wheels will scratch a floor while moving because they slide instead of roll. There is usually a reason for a set of wheels developing a flat spot, and quite often it is because one of the braces on which the wheel is mounted has become twisted. Sometimes chewing gum and small rocks or gravel will stick on coaster wheels and cause them to skid and become flat. A big pipe wrench can be used to straighten out the twist. An occasional oiling of the coaster cart wheels without about number thirty weight motor oil will help the wheels to move freely.

³ Conversation with Mr. Bill Gandrud, piano repairman and tuner, Dillon, Montana.

CHAPTER VI

SOFT SOLDERING

Equipment needed:

Sandpaper

Solder

Small gauge wire (16, 17, or 18) and pliers

Soldering paste or a good cleaner

A flame that may be moved to different positions such as a small propane soldering outfit

Clean rags

Water

If an amateur is to attempt to solder an instrument, he should first consider the value of the instrument. Soldering older silver plated horns is quite easy. The lacquer finished horns present a few more problems besides the actual soldering. Most amateurs are not skilled enough at soldering to avoid burning the lacquer, thus the surface must be repolished and relacquered. If the equipment for relacquering and polishing is available, there is still the problem of matching the lacquer. On expensive horns the soldering jobs should be left to a competent repairman.

To solder parts together on an instrument, the surfaces to be soldered must first be cleaned so all corrosion and grease is removed. Scrape or sand the areas and then wipe them clean. Next, a thin layer of soldering paste should be spread over the areas to be soldered. If a person wants to be quite conscientious about his work, he can slightly heat the areas that are to be

soldered that have paste on them . Then with a clean rag, wipe the areas free of this heated paste and apply a new coat . This process cleans the metal quite thoroughly .

Next butt the two surfaces together as they will be when soldered . When in place, a fairly light wire (size 16, 17, or 18) should be used to secure the surfaces so they will not slip while being soldered . The pieces should not be wired together very tightly because there would not be room for the solder to draw between the two surfaces . A good 70 per cent tin and 30 per cent lead solder will draw between the two surfaces quite well .

While using a flame to heat the areas to be soldered, keep touching the joint with the lead solder to see if enough heat has been applied . If the area is hot enough, let some of the solder melt and draw between the two surfaces until it can be seen all around the joint . While the solder is still in a liquid state, wipe any excess off the horn with a clean rag . Caution: do not melt the solder with the flame; the metal must be hot enough to melt the solder . If acid core solder is used, wash the area with water after soldering to neutralize any acid that may have spattered on the surface of the horn .

There is a new type of solder manufactured by Eutectic that has a very high capillary action and is much stronger than lead solder; also if polished, it does not dull as does lead solder . The preparation for using this Eutectic solder is the same as for lead solder .

¹Conversation with Mr . Bill Kober, Agriculture Teacher, Three Forks, Montana .

Eutectic Rod 157-B, the best for instrument repair, may be secured
from either of the following addresses:

Eutectic Welding
Alloys Corp.
40-40 . 172nd Street
Flushing 58, New York

Eutectic Welding Alloys
Northwestern Division, Inc.
2712 Second Avenue
Seattle, Washington

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